

Consortium for Verification Technology Fellowship Report

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Overview

As one recipient of the Consortium for Verification Technology (CVT) Fellowship, I spent eight days as a visiting scientist at the University of Michigan, Department of Nuclear Engineering and Radiological Sciences (NERS). During this time, I participated in multiple department and research group meetings and presentations, met with individual faculty and students, toured multiple laboratories, and taught one-half of a one-unit class on Risk Analysis in Nuclear Arms control (six 1.5 hour lectures). The following report describes some of the interactions that I had during my time as well as a brief discussion of the impact of this fellowship on members of the consortium and on me/my laboratory's technical knowledge and network.

Meetings and Events Attended:

Women in Nuclear Engineering and Radiological Science (NERS) guest speaker:

During this event, I met with about 15 women who were either faculty or students in the NERS department. During this time, I gave a brief introduction of myself including my career path and research interest. I highlighted important lessons that I learned during my career. I also accepted questions from the group that ranged from mentoring to having a career at the National Laboratories.

Lecture by Michael Nacht on nuclear policy issues

The Detection for Nuclear Nonproliferation Group meeting – Learned about on-going research in the group through a variety of informal talks given by students and post-docs

Lecture:

For this fellowship, I developed and delivered half of a one-unit course on verification in arms control. My class was six, one and a half hour lectures diving into the idea of how risk analysis can be applied to nuclear arms control. Thirteen students enrolled in the class with approximately five other students/post-docs/faculty that audited the class. This course aimed to allow the students to think deeply on a systems level about how their specific research technology or other technology that a student may be interested in fits into an overall nuclear arms control verification protocol. Students accomplished this through a risk analysis lens by identifying how their chosen technology can be used, what may make the technology fail, and what the consequences of this failure are. The specific learning outcomes for this section of the course were:

- Identify a potential verification technology and create a potential protocol on how this technology can be used in a future arms control treaty
- Develop scenarios that could lead to failures in a potential arms control regime due to either faulty use or subversion of the identified technology.
- Identify consequences of the failure scenario

- Apply a risk analysis framework to each developed scenario to compare across the class
- Identify what mitigation actions could be taken to either make the failure scenario more difficult to occur or the severity of the consequences less.

Faculty meetings/Student Meetings/Laboratory Tours:

- Igor Jovanovic- NERS professor- discussion of research interest and laboratory tour
- The Detection for Nuclear Nonproliferation Group – laboratory tours and student only information and mentoring lunch.
- Orion Radiation Measurement Group – laboratory tours and one-on-one discussions with students
- Gabrielle Hecht – Professor – meeting to discuss the policy and history in association to radiation and radiological issues
- Patricia Schuster – Presidential Post-Doctoral Fellow – meetings to discuss the intersection of radiation detection and arms control policy
- Jeff Fein – Graduate Student in NERS (graduated Jan 2017) soon to be staff at SNL –discussion of dissertation and mentoring
- Marc Paff – Post-doc in NERS – discussion of systems analysis and career paths
- Michael Hamel – Graduate Student in NERS – discussion of career paths at the National Labs
- Valerie Nwadeyi – Graduate Student in NERS – discussion of research, career paths, diversity, and potential research opportunities through NSF grants

Impact:

The CVT fellowship allowed me to work with students and faculty from the University of Michigan and develop deeper relationships. Overall, I gained a deeper understanding of the fundamental scientific research that is being done that will potentially impact future arms control negotiations. Further, through the development of the risk analysis class, I was able to develop a potential framework to evaluate different arms control protocol and technology using a risk analysis lens. This framework will be brought back to Sandia National Laboratories and may be further developed into a future NA-22 proposal. Through the teaching of the class, I gained fresh perspectives from the students, including many international views, which is more difficult to get within the proliferation detection/arms control community at the National Labs. Other impacts from my visit included the exposure of students to the discipline of systems analysis through both the class and individual discussions, exposure of students to Sandia National Laboratories as a career path, and general mentoring of students due to my varied meetings and discussions.